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CONTROL OF HEAVY INFESTATIONS OF PURPLE SCALES ON GRAPEFRUIT TREES

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In the Southeastern States heavy infestations of purple scales (Lepidosaphes beckii (Newm.)) develop on grapefruit trees and on some orange varieties, such as the Temple. This is particularly true in the coastal districts, where trees are usually sprayed once or twice each spring with copper fungicides and once with zinc and manganese compounds for minor element deficiencies. These compounds are added to regularly scheduled wettable-sulfur sprays, and the combination leaves heavy residues on the leaves and fruits. These residues favor increases of scale insects (Osburn and Spencer 1, Spencer 2), and the heavy infestations that develop are difficult and costly to control.

For many years oil-emulsion sprays have been used for controlling these heavy infestations. They are effective when applied with thorough coverage before the infestation reaches damaging levels, but inasmuch as oil emulsion is incompatible with sulfur, it must be put on as an extra application, and this procedure increases costs. Also, when purple scale infestations develop in the fall and winter, oil sprays are objectionable because of harmful effects on fruit quality and color and the possibility of defoliation in cold or dry weather. Growers whose trees have heavy infestations in the fall often prefer to take the damage from the scales rather than to risk the damage from the oil spray and increase costs by using it.

Preliminary experiments conducted during 1949 and 1950 (Spencer et al. 3) indicated that parathion had great promise. Two sprayings with 1 pound of 15-percent wettable parathion per 100 gallons of water, in March and July, allowed only a slight increase in infestation through the year. It was evident, though, that further work was needed to determine the number of sprayings necessary each year, and the concentrations, to reduce the infestations to satisfactory levels and to hold them there. For this work a grove of Ruby grapefruit trees near Fort Pierce, Fla., was selected.[1/]

1/ Norman G. Platts was the grower cooperator.

Experiments in 1950

In 1950 the grove was arranged in 10 blocks of randomized single-tree plots for comparison of six spray programs. The postbloom spray was applied on March 28 and the summer spray on July 10. These programs, shown in table 1, will be designated as 1-0, 0-1, 1-1, 2-0, 0-2, and 0-0.

Table 1.--Control of purple scales on grapefruit trees with one or two sprays of parathion applied in 1950

Pounds of 15-percent wettable parathion per 100 gallons in spray on--		Numbers of living purple scales per leaf on--	
March 28	July 10	July 10[1/]	Nov. 20
1	0	3.57	20.81
0	1	1.56	13.91
1	1	3.98	9.33
2	0	14.56	22.42
0	2	15.62	10.65
0	0	15.62	25.22
Difference required for significance:			
At 5% level ----------		3.84	7.31
At 1% level ----------		5.13	9.77

1/ Before spraying.

A composite sample of leaves taken from the grove just before the first spraying indicated an infestation of 734 living purple scales per 100 leaves, a high infestation. At the end of the season all the treated groups had infestations higher than at the initial sampling. Best control was had with the 1-1 program, next best with the 0-2 program, and third best with the 0-1 program. With all the single-spray programs the infestations were high sometime during the season. Single sprayings seemed ineffective in producing year-round control of heavy infestations.

Since two sprayings at 1 pound per 100 gallons did not quite hold the infestation to starting levels, it seemed advisable to try two applications at higher concentrations and also three applications of the 1-pound concentration.

Experiments in 1951

In 1951 the same trees were used, and the six programs were 1-2-0, 2-0-0, 1-1-0, 1-0-2, 0-2-0, and 1-1-1. The postbloom spray was applied on April 2, the summer spray on June 1, and the fall spray on November 7.

As shown in table 2, single applications of sprays containing 2 pounds of 15-percent wettable parathion per 100 gallons, whether made in April or in June, permitted increases in infestation. The 1-2-0 program gave good early and midseason control, but allowed some fall buildup. The same was true of the 1-1-0 program, except that the buildup was greater in the fall. The 1-0-2 program gave good fall cleanup, but allowed too much buildup in the summer. The best program in 1951 was three applications of the 1-pound dosage, which reduced an infestation of 25 scales per leaf to around 4, and held it there throughout the year. However, 4 scales per leaf is too high.

Table 2.--Control of purple scales on grapefruit trees with one, two, or three sprays of parathion applied in 1951

Pounds of 15-percent wettable parathion per 100 gallons in spray on--			Numbers of living purple scales per leaf on--			
April 2	June 1	Nov. 7	Nov. 20, 1950	June 1, 1951 1/	Oct. 17, 1951	Jan. 5, 1952
1	2	0	20.81	2.29	1.34	6.07
2	0	0	13.91	.50	8.22	14.53
1	1	0	9.33	1.47	2.67	9.10
1	0	2	22.42	3.43	14.89	.52
0	2	0	10.65	8.14	3.15	11.16
1	1	1	25.22	3.27	4.35	3.95
Difference required for significance:						
At 5% level ----------			7.31	1.52	3.00	4.02
At 1% level ----------			9.77	2.03	3.99	5.36

1/ Before spraying.

Experiments in 1952

In 1952 the work was carried further. The 1-1-1 program was again included, and also 1-2-1, 2-1-1, 1-1-2, 1-2-2, and 2-2-2. The date for the posthloom spray was March 31, the summer spray July 8, and the fall spray September 10.

As shown in table 3, all six programs gave excellent control. Over the 2 years the 1-1-1 program reduced the infestation of 25 scales per leaf to 0.03 by September 1952 and eradicated it by late in October. The 2-1-1 program reduced 14 scales per leaf to 0. The other programs in 1952 were equally good but were not better, and some of them involved the use of larger amounts of parathion.

Table 3.--Control of purple scales on grapefruit trees with three sprays of parathion applied in 1952

Pounds of 15-percent wettable parathion per 100 gallons in spray on—			Numbers of living purple scales per leaf on—			
March 31	July 8	Sept. 10	Jan. 5	July 7	Sept. 9	Oct. 27
1	2	1	6.07	8.56	0.01	0.01
2	1	1	14.53	1.26	0	0
1	1	2	9.10	10.78	.01	.01
1	2	2	.52	2.29	0	0
2	2	2	11.16	2.02	0	0
1	1	1	3.95	4.36	.03	0
Difference required for significance:						
At 5% level ----------			4.02	4.37	-	-
At 1% level ----------			5.36	5.84	-	-

Where only 1 pound of 15-percent wettable parathion was added to the posthloom combination spray, there was a slight buildup in July. This tendency can be seen in the 1-2-1, 1-1-2, 1-2-2, and even in the 1-1-1 programs. However, the later applications reduced infestations after the inert residues from the posthloom spray had largely disappeared. In contrast, where 2 pounds of 15-percent parathion was added to the posthloom [illegible] the early buildup of scales was more severe because of heavy inert residues.

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Discussion

All the parathion spray programs described above were safe for trees and fruit, and the best of the programs prevented damage from purple scales.

These experiments suggest that, on grapefruit and orange trees sprayed with copper and nutritional materials, 2 pounds of 15-percent wettable parathion be added to the postbloom combination spray and 1 pound each to the summer and fall wettable-sulfur sprays. After the first year 1 pound in each of the postbloom, summer, and fall sprays will probably be sufficient for year-round control of these heavy infestations.

Literature Cited

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